OROVILLE FACILITIES RELICENSING
(PROJECT NO. 2100)

SP-W3, Task 1A Interim Report

SP-W3. Recreational Facilities and Operations Effects on Water Quality
Task 1.Effects of Current Recreation Facilities and Operations
Task 1A. Identification of Potential Effects to Water Quality

REVIEW DRAFT

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Introduction

Existing and future operation of the Oroville Project recreational facilities, operations, and activities may have effects on the physical, chemical, and biological integrity of water quality. The Environmental Workgroup identified issues related to the recreational facilities and operations of the project. Issues identified included potential for introduction of nutrients, bacterial contamination at swim areas such as the North Forebay, sewage spills into Lake Oroville, fuel spills as a result of fluctuating lake levels, and contamination from boat maintenance and cleaning products.

Numerous recreational and related activities occur within the project boundary. Various bike, horse, and hiking trails, boat launching and maintenance facilities, camping areas, concessions, waste handling facilities, and swim areas have been developed in association with the project. The proximity of recreational facilities and their associated activities to the shoreline and banks of project waters offers potential for shoreline erosion and introduction of nutrients and bacterial contaminants. Recreational activities may also introduce contaminants into project waters, such as MTBE or oils and greases from watercraft operation and maintenance, petroleum hydrocarbons (polynuclear aromatic hydrocarbons or PAHs) from fuel spills and floating gas tanks, and nutrients and bacteria from floating septic systems, restrooms, watercraft gray water tanks, and pump out facilities.

A study plan was developed and approved by the Environmental Workgroup to evaluate the effects from recreational facilities and operations on water quality. Task 1 of that study plan was to evaluate the potential for recreation facilities to affect water quality in the project area and develop appropriate monitoring. This report presents the results of that task.

Objective

The objective of the study is to evaluate the potential effects of recreational facilities, operations, and activities on the physical, chemical, and biological integrity of project waters. Effects from project facilities and operations to the integrity of project waters, as well as general water quality conditions, are evaluated in SPW1. This study will evaluate localized effects to water quality from specific recreational facilities and activities.

Study Area

The study area is generally within the project boundary, but also includes adjacent lands and waterways for effects to project waters, and downstream for project effects in the Feather River.

Methodology & Analysis

This study is focused on evaluating the potential for recreation facilities, operations, and activities to affect water quality, and proposing monitoring to determine the extent of potential contamination. Data obtained from the study will be compared to water quality goals and criteria for protection of beneficial uses. Some future recreational facilities and operations are known, but others will not be known until near the end of the study. Information from recreation study plans was obtained, as necessary, to evaluate potential contamination and their sources from recreation facilities, operations, and activities.

The current Lake Oroville State Recreation Areas map was reviewed for completeness and updated to insure that all recreational facilities and activities have been identified. The potential types of contamination associated with each type of recreational facility and activity were identified. Field surveys were conducted to determine potential sources of contamination from recreation facilities and activities. Operators of recreation facilities were contacted, recreation facilities visited, and recreational activities reviewed to determine potential for contamination to project waters. The interviews and field visits were conducted to identify potential sources of contamination, potential contaminants, source pathways, and operations and management that may contribute to contamination.

Specific monitoring was developed following determination of the potential for each type of recreational facility and activity to contaminate project waters. The contribution of contaminants from wildlife will also be investigated where appropriate, such as waterfowl contribution to bacterial levels at swim areas. The monitoring program was designed to target specific recreational facilities and activities with potential to introduce contaminants into project waters and will be presented to the Environmental Work Group for review and approval prior to implementation.

Monitoring for effects to water quality from recreational facilities and activities is dependent upon the type of recreational facility or activity and the period of impact. Parameters proposed to be monitored include turbidity, sediments, microbiological indicator organisms (i.e., coliform and enterococcus bacteria), petroleum byproducts (e.g., PAHs, MTBE, oil and grease), nutrients, pesticides, paints, and vessel cleaning products. Weekly and event-based (e.g., holiday weekends, recreation or fishing tournaments, spills) water quality data collection is proposed during the recreation season or event. Monthly or other appropriately timed monitoring is proposed to determine effects from activities that occur throughout the year.

Results & Discussion

Information derived from the first phase of this study was used to determine whether recreational facilities, operations, and activities could adversely affect the physical, chemical, or biological integrity of project waters. Each of the facilities within or adjacent to the project boundary were inventoried and assessed for potential impacts. This information identified types of facilities and potential contaminants (Table SPW3-1), as well as potential sources of contamination, source pathways, operations and management that may contribute to contamination, and effectiveness of facility or operations in preventing contamination.

Table SPW3 - 1. Types of Recreational Facilities and Potential Contamination

Recreational Facility Type	***Potential Contamination***
ATV/ORV	No impact expected
Bike/Hiking/Horse trail	Sediment (erosion); bacteria & organics from horse manure; petroleum byproducts from trailhead parking
Boat/car top access	Sediment (erosion, road runoff); petroleum byproducts
Boat, power	Petroleum byproducts; erosion (boat waves)
Boat, house	Bacteria & organics from sewage; petroleum byproducts
Boating/no power	No impact expected
Boat launch	Sediment (erosion, road runoff); petroleum byproducts
Boat-in camping	Bacteria & organics from sewage; petroleum byproducts
Boat, maintenance facilities	Petroleum byproducts; paint flakes & dust; cleaning products; sand
Campfire center; Campground; Camping/group	Sediment (erosion, road runoff); bacteria & organics from sewage; pesticides
Camping, floating	Bacteria & organics from sewage and human contact; petroleum byproducts; garbage
Concessions	Petroleum byproducts; metals; garbage
Dump station	Bacteria & organics from sewage
Equestrian camp	Bacteria & organics from sewage
Fish cleaning station	Organic materials
Hunting	No impact expected
Marina	Petroleum byproducts; bacteria & organics from sewage; heavy metals from boat antifouling paint, pesticides, wood preservatives, & biocides; fuel additives; sediment (erosion, road runoff, & sandblasting); garbage
Nature study	Sediment (erosion, road runoff)
Picnicking	Erosion; garbage
Restrooms	Bacteria & organics from sewage
Restrooms, floating	Bacteria & organics from sewage
Swimming	Bacteria & organics from sewage and human contact, and garbage
Trailhead/with parking	Sediment (erosion, road runoff); petroleum byproducts
Special Events	Petroleum byproducts; organics; erosion (boat waves)

All-terrain vehicle/Off-road vehicle (ATV/ORV)

Description: There is one ATV/ORV area adjacent to the project area, which is the Oroville Off-Road Vehicle Recreation Area south of State Highway 162 and east of Larkin Road. This facility (commonly known as the "Clay pit") is the former borrow area for the material for the construction of Oroville Dam. CDPR now manages this area as a public ATV/ORV recreation area.

Potential contamination concerns: Since the area is lower in elevation than the surrounding lands, outflow of potential contaminants is not a concern. The ground is primarily clay, with little chance for seepage to the water table.

Proposed monitoring: Since there is little chance of potential contamination to project waters, no monitoring is proposed.

Bike/hiking/horse trails

Description: There are approximately 70 miles of trails within the project area. The longest trail is the Brad Freeman Memorial/Oroville Bike Trail at approximately 42.7 miles. This trail starts at the Oroville Dam, passes through the Oroville Wildlife Area, around the Thermalito Forebay and Afterbay, and back again to the Dam. The Bidwell Canyon Trail, which is approximately 13.5 miles long, starts at the Saddle Dam on the south end of Bidwell Canyon, travels north up the western shore of Bidwell Canyon to the tip of Kelly Ridge, south along the top of Kelly Ridge, and back to the Saddle Dam. The Dan Beebe Trail, at approximately 10 miles long, runs around the perimeter of and across Kelly Ridge. The Loafer Loop/Roy Rogers Trail is an approximately five-mile loop in the Loafer Creek Campground. The Roy Rogers portion of the Loafer Creek trail system is used on alternate days by horseback riders.

Potential contamination concerns: Construction, maintenance, and trail clearing could lead to sedimentation from erosion. Most of the trails have been cut into the slopes, with unarmored exposed 'road cuts' of varying depths. Many of the trails are maintained by surfacing the trail with decomposed granite sand, which is a very light and erosive soil. The heavy rains in winter also cause serious erosion problems due to the loosely packed exposed soils of the unpaved or unsurfaced portions of these trails. Since many of the trails run across steep slopes with no runoff preventative or ameliorative measures in place, bike, hiker, and horse traffic disturbance in the unpaved portions could have serious erosive effects on these relatively loose soils.

Bacterial contamination may be a concern on the Roy Rogers portion of the Loafer Creek trail system. The trail is confined primarily to the west side of the Loafer Creek Recreation Area on the eastern shore of the Bidwell Canyon Arm of Lake Oroville and along Deadman Ravine. Other portions of the Loafer Creek trail system are also used by horseback riders, though not to the same extent. Since the trail crosses streams and runs along fairly steep slopes in most areas, horse manure can be washed down by rain from anywhere along the trail.

Proposed monitoring: Since one of the major concern from the trails is erosion, a visual inspection of the trails for signs of erosion will be performed monthly beginning with the first significant rains of the wet season.

The potential contamination from horse manure along the trail will be addressed by bacterial and nutrient sampling at the mouths of Deadman Ravine and Loafer Creek immediately after the first three significant rain events. Bacteria and nutrient sampling will be conducted in the Bidwell Canyon Arm of Lake Oroville near the center of the drainage downslope from the main riding area at the same time.

Boat/car top access

Description: There are numerous car top boat access points at the Oroville Facilities (Table SPW3-2), in addition to the developed boat launches. Some of the access points consist of old roads that formerly crossed the Feather River canyon but which now terminate at Lake Oroville. Other car top access points consist of unpaved roads developed to provide recreational access but which lack developed launch facilities, such as areas at the Thermalito Afterbay and ponds in the Oroville Wildlife Area. Still other access areas are nothing more than natural degraded banks that now allow for easy access. These types of access areas are most extensive along the Feather River downstream from the dam. Many of these access points were not built by the State or other agency and tend not to be regularly maintained. Usually, there are no associated features, such as restrooms, fuel, docks, or other facilities.

Table SPW3 - 2. Boat/car top access Points

Name	***T/R/S***	***Location***
Lake Oroville Access Points		
Dark Canyon	21N04E14	Dark Canyon Arm of Lake Oroville, south shore @ end of Canyon Road(CR545/45A)
Foreman Creek	20N05E18	Lake Oroville, main body near Foreman Creek mouth @ end of Foreman Creek Rd.
Nelson Bar	21N04E07	West Branch Arm Lake Oroville, western shore at end of small road off Lime Saddle Powerhouse Rd
Stringtown	19N05E01	South Fork Arm Lake Oroville @ end of Stringtown Road
Vinton Gulch	21N04E21	Vinton Gulch @ mouth
Thermalito Afterbay Access Point		
South Afterbay	19N03E29	North shore of Lower Thermalito Afterbay @ southern end of Wilbur Road
Oroville Wildlife Area		
Mile Long Pond	18N03E09	West side of Feather River @ south end of Mile Long Pond
Lower Feather River Access Points		
Afterbay Outlet	19N03E33	Lower Feather River 1000' upstream from Afterbay Outlet
Wildlife Area	19N03E33	Lower Feather River 900' downstream from Afterbay Outlet
Wildlife Area	18N03E04	Lower Feather River 1.25 mi downstream from Afterbay Outlet
Wildlife Area	18N03E04	Lower Feather River 1.30 mi downstream from Afterbay Outlet

Potential contamination concerns: Sediment from erosion and road runoff and petroleum byproducts are the main potential water quality concerns at these boat access points. Both paved and unpaved access points could have sediment problems. The paved access points can have road base washout from long-term soaking or wave and wake action erosion. Unpaved access points release sediments directly during use by boaters (dragging, launching, landing). Petroleum byproducts could be released at car top boat access sites during launching from spills, leaky gas tanks, or discharge from boat motors. Petroleum byproducts on the water bodies affected by car top boat access are being monitored under other aspects of this study. Specific petroleum byproducts contamination at car top boat access sites, however, is not being assessed. However, the potential contribution to sediment production, turbidity, or petroleum byproducts from these areas is insignificant due to their limited use and in relation to other potential sources within each of the water bodies where car top boat access exists.

Proposed monitoring: Sedimentation, turbidity, and petroleum byproducts within the water bodies affected by car top boat launching are being assessed by other studies or in relation to other aspects within this study. Therefore, no additional sediment, turbidity, or petroleum byproduct monitoring is proposed. However, car top boat access sites will be field visited once during the more intense use periods of the spring, summer, and fall to visually assess (including photographs) any erosion and petroleum hydrocarbon issues.

Boat, power

Description: Power boating is popular within the project area on Lake Oroville, the Thermalito Forebay and Afterbay, and the Feather River. At this time, exact figures on recreational boating use have not been developed. On the Feather River and Thermalito Forebay and Afterbay, the great majority of the boating is associated with fishing, though the Afterbay is experiencing greater speed boat use. On Lake Oroville, the boating is more diverse, and includes all types of power boats (ski boats, fishing boats, and wave-runners; houseboats, though a power boat, are discussed in a separate section) Recreational activities engaged in during boating include fishing, skiing, wave boarding, swimming, picnicking, and camping.

Potential contamination concerns: Petroleum byproducts could contaminate project waters due to spills, leaky gas tanks, and bilge. Additionally, power boats could contribute to bacteria and organic materials from sewage, leaky containment tanks, open valves, deliberate dumping, and possibly from associated swimming activities. Power boats can also contribute to shoreline erosion and turbidity from waves produced by speeding boats.

Proposed monitoring: Since the boating activity on the project waters is so widespread, sampling would also have to be very widespread. Under Study Plan SPW1, area-wide

sampling for bacteria is already being performed. Therefore, under this study plan, no additional sampling is proposed for bacteria.

However, the introduction of petroleum hydrocarbons from use of power boats is not being addressed in other studies. Therefore, PAH monitoring will be conducted on the Lake, Forebay, Afterbay, and the Feather River station downstream from the Afterbay Outlet monitored in SPW1. These products will be monitored at these stations monthly during the most recreational intense use period (June to August). .

Boat, house

Description: House boats, a more leisurely form of power boating, are popular on Lake Oroville, though no exact figures are available at this time. Most of the houseboats are moored in one of the two moorages available to them. Bidwell Canyon Marina has the capacity to moor approximately 200 houseboats, plus anchored docks in the middle of the harbor for approximately 50 more houseboats. Lime Saddle Marina has approximately 150 moorages available for houseboats, plus an extended dock to which many houseboats choose to tie up. Houseboats can be launched at Bidwell Canyon, Lime Saddle, or Spillway boat launches, but this is a process usually handled by professionals (boat yards, marinas).

Potential contamination concerns: PAHs from spills, leaky gas tanks, and bilge are a potential contamination concern. Additionally, house boats could contribute to bacteria and organic materials from sewage, leaky containment tanks, open valves, deliberate dumping, or associated swimming activities. The California Department of Parks and Recreation maintains an inspection program that includes visual inspections of underwater house boat disposal plumbing by divers. CDPR feels this program is effective in preventing significant deliberate dumping of wastes from house boat black and gray water containment systems.

Proposed monitoring: Area wide monitoring for bacteria being conducted in SPW1 should be sufficient for the open lake areas. SPW1 monitored coliform bacteria around the 2002 Labor Day weekend from two sites within the mooring area of house boats at Bidwell Canyon. Additional samples should be collected at other times of the year from both mooring areas. Therefore, this study will collect samples for coliform bacteria analyses from both the Lime Saddle and Bidwell Marina house boat mooring areas. Two sites within each mooring area will be sampled monthly from June through August.

Fish accumulate petroleum byproducts in their bodies and, hence, are good indicators of petroleum byproduct exposure. Fish have been collected under SPW2 from the Lime Saddle Marina area for analyses of PAHs. No further monitoring to determine potential petroleum byproduct contribution from house boats is proposed until the results of these analyses become available. However, observations will be made for tell-tale sheens often left by petroleum byproducts during other monitoring activities in the vicinity of house boat mooring areas.

Boating, no-power

Description: No-power boating consists primarily of sailing on Lake Oroville, the North Forebay, and the Afterbay, canoeing, rafting, or drift boating on the Feather River, and scull boating on the Afterbay. Within project waters, no-power boating is not as widespread or popular as power boating. Most sailboats are moored in one of the two marinas (Bidwell Canyon or Lime Saddle), while the remainder can be launched at one of the paved boat launches (Bidwell Canyon, Lime Saddle, Loafer Creek, Spillway, North Forebay Recreation Area, and Monument Hill at the Afterbay). Since there are no significant whitewater features along the lower Feather River, rafting and canoeing along the Feather River are widely spaced and infrequent. These activities tend to be a low impact type of recreation.

Potential contamination concerns: With no-power boating, there are less concerns for potential contamination. Sailing could be a potential source of petroleum byproducts in the larger, engine-assisted sailboats, as well as bacteria from human waste. Rafting and canoeing activities are considered not a source of significant contamination. Boats tend to be launched by hand and petroleum byproducts usually are insignificant (except for the larger engine-assisted sailboats). There may be a minor potential for contamination from bacteria from related swimming activities.

Proposed monitoring: Since no-power boating activity on the project waters is so widespread, sampling would also have to be very widespread. Under Study Plan SPW1, area-wide sampling for bacteria is already being performed. Monitoring for PAHs will be conducted under this study plan in conjunction with evaluating potential effects from power boats, which is sufficient to include any effects from engine-assisted sailboats. Therefore, under this study plan, no additional sampling is proposed for evaluating effects from no-power boating.

Boat launch

Description: There are nine paved boat launches in the project area accessing Lake Oroville, Thermalito Forebay, and Thermalito Afterbay (Table SPW3-3).

Table SPW3 - 3. Boat Launches

Name	*T/R/S*	*Location*
Bidwell Canyon	19N05E06	Northside of Hwy 162, west shore of Bidwell Canyon Arm Lake Oroville
Enterprise	19N05E01	End of Enterprise Rd, west off Lumpkin Rd., north shore of South Fork Arm Lake Oroville
Lime Saddle	21N04E17	Eastside of Pentz Rd. ~2 miles north of Hwy 70, west shore of West Branch Lake Oroville
Loafer Creek	19N05E06	Northside of Hwy 162, east shore of Bidwell Canyon Arm Lake Oroville
Spillway	20N04E35	West end of Oroville Dam ~1.5 miles west of Oro Dam Blvd, southwest shore of Lake Oroville
North Forebay	19N03E01	Westside of Hwy 70 at Garden Dr. exit

South Forebay	19N03E10	Northside of Grand Avenue, ~3 miles west of Hwy 70
Monument Hill	19N03E20	Southside of Hwy 162, ~1 mile east of Hwy 99
Wilbur Road	19N03E17	Westside of Wilbur Rd., ~0.25 mile north of Hwy 162

Of these nine, the boat launch at Thermalito Forebay North is a no-power boat launch used primarily for sailboats. Seven of the boat launches are associated with other recreational facilities, such as swimming and picnicking areas, marinas, campgrounds, and day-use areas. The two boat launch facilities associated with the marinas on Lake Oroville are Bidwell Canyon and Lime Saddle. Five of the launches (Bidwell Canyon, Forebay North, Lime Saddle, Loafer Creek, and Spillway) have permanent restrooms connected to the city sewer service. Monument Hill has a permanent restroom with a sealed chemical holding tank. Forebay South and Wilbur Road have portable restrooms only.

Potential Contamination Concerns: The primary contamination concern for boat launches is petroleum byproducts possibly introduced to project waters during launching from spills, leaky fuel tanks, or bilge discharge. During launching, partial immersion of the automobile undercarriage could introduce gasoline, diesel, grease, and oil.

Proposed monitoring: The three most heavily used facilities (Lime Saddle, Bidwell Canyon, and Spillway) are proposed for monthly monitoring during the most intense recreation use period (June through August) to determine whether petroleum byproduct discharges from boat launches are significant. If significant contamination is found at these sites, monitoring will be conducted at the other launch facilities, as well. Sampling stations will be about 30 feet into the water from the ramp water line. The surface of the water will be visually inspected for petroleum sheen. Water samples for PAHs will be taken at the surface. Environmental parameters, such as water temperature, dissolved oxygen, electrical conductivity, pH, and turbidity, will also be measured at these stations.

The boat launch at North Forebay is a no-power boat launch, associated with the sailboat maintenance and storage facility. Sampling for PAHs is unnecessary at this launch. However, the sailboat maintenance and storage facility at the boat launch could be a source of contaminants. Sampling is proposed to assess the potential impact of this facility and is addressed under 'Boat, Maintenance Facilities', below.

Boat-in camping

Description: There are three boat-in campgrounds on Lake Oroville where access is by boat only (Table SPW3-4). There is a limited swimming area at Bloomer Primitive Area, but most people swim from their boats rather than from a beach. Fishing access is readily available along the shorelines.

Potential Contamination Concerns: Bacteria from high swimming use of the campgrounds and the pit toilets at Goat Ranch is a potential contamination concern. Additionally, fish cleaning and organic garbage from campers could lead to nutrient enrichment. Sedimentation from high boat use and swimming could lead to higher than normal turbidity in the areas.

Table SPW3 - 4. Boat-In Camping

Facility	*TRS*	*Location*	*#Campsites*	*Restrooms*
Bloomer Primitive Area	20N04E11	West shore of North Fork Arm Lake Oroville, in 'The Slot'	36	Floating restroom
Craig Saddle	20N05E34	South shore of Middle Fork Arm Lake Oroville	18	None
Goat Ranch	21N04E26	West shore of North Fork Arm Lake Oroville ('The Slot')	5	Pit toilets

Proposed Monitoring: Proposed sampling at the boat-in campgrounds will include surface water samples for bacteria, petroleum byproducts, and nutrients. Samples will be taken monthly during the period of heavy recreational use (June to August) from the surface approximately 30 feet from the shoreline at all three campgrounds. The floating restroom at Bloomer Primitive Area is discussed later in the "restrooms, floating" section of this study plan. Physical parameters will be measured at the surface for turbidity, dissolved oxygen, pH, conductivity, and temperature.

Boat, Maintenance Facilities

Description: There are boat maintenance facilities associated with Bidwell Marina, Lime Saddle Marina, and North Forebay Marina. Each provides boat servicing, repair, renovation, and painting. The North Forebay Marina stores and services sailboats and other no-power boats.

Potential Contamination Concerns: Sandblasting during preparation of boats for painting could contribute to turbidity and sedimentation. The sand is allowed to wash down through the road drainage system to the lake. The boat repair shops could contribute to heavy metals and chemical contamination through the removal or application of boat antifouling paint, pesticides, wood preservatives, and biocides. The facilities at Bidwell and Lime Saddle marinas could also contribute PAHs through engine repair and servicing.

Proposed Monitoring: Sampling is proposed at all three boat maintenance facilities for turbidity, sediment (particularly sand used in sandblasting), metals, anti-fouling paints, wood preservatives, and biocides (e.g., BHT) associated with boat maintenance. PAH sampling is proposed at Bidwell and Lime Saddle boat facilities. Surface water samples will be taken near the main drainage of each facility where the outfall enters the project waters at the first three rain events that produces significant runoff.

Campfire center, Campground, and Camping/group

Description: There are four designated campgrounds located within the project boundary (Table SPW3-5). Of these, only Loafer Creek has a developed swim area. All of the campgrounds have some sort of restroom facilities. All but one (Oroville Wildlife Area primitive campground) is on city sewer service. The Oroville Wildlife Area campground has only portable restrooms. The three developed campgrounds have areas for group

camping as well as tent/RV camping. A campfire center and amphitheater are located within the project area at the Loafer Creek Campground.

Table SPW3 - 5. Campgrounds

Facility	*TRS*	*Location*	*# Campsites*	*Restrooms*
Bidwell Canyon	19N05E06	End of Canyon Dr. northside of Hwy 162 ~5 miles east of Oro Dam Blvd	147	City sewer
Lime Saddle	21N04E07	Eastside of Pentz Rd. ~	100	City sewer
Loafer Creek	19N05E05	Northside of Hwy 162 ~ 6 miles from Oro Dam Blvd	74	City sewer
Oroville Wildlife Area	18N03E22	End of Palm Ave. off eastside of Larkin Rd.	50	Portable restroom

Potential Contamination Concerns: Campgrounds could contribute eroded sediment from the exposed soils of the campsites and constructed trails. Due to the relatively high density of the roads in and around the campgrounds, petroleum byproducts could be a concern from road runoff. Discarded garbage could contribute to nutrient enrichment (as well as aesthetic impairment).

Proposed Monitoring: Since sediment input from exposed soils into project waters is a potential concern, a visual assessment for erosion will be performed monthly during the rainy season. Surface water samples will be collected during the first three months of the rainy season for turbidity, bacteria, PAHs, and nutrient analyses from a representative drainage near the center of the campground. Physical parameters will be measured at the surface for dissolved oxygen, temperature, conductivity, turbidity, and pH.

The Bidwell Canyon Campground is on a small peninsula on the Bidwell Canyon Arm of Lake Oroville. The proposed sampling station is at the mouth of the small drainage at the south end of Bidwell Canyon Road. The Lime Saddle Campground is on a peninsula on the western shore of the West Branch of Lake Oroville north of the marina. The proposed sampling station is at the mouth of the small unnamed creek on the southwest side of the peninsula.

The Loafer Creek Campground is located on the western shore of the Bidwell Canyon Arm of Lake Oroville. The area is drained primarily by three small creeks — Loafer Creek to the east, Deadman Ravine to the south, and a small unnamed creek to the north. Sampling is proposed at the mouth of the unnamed creek, which drains a large representative area of the campground.

The primitive campground at the Oroville Wildlife Area is surrounded by levees and does not drain directly into any project or adjacent waters. Therefore, no monitoring is proposed.

Campgrounds, Floating

Description: There are four floating campgrounds on Lake Oroville (Table SPW3-6). These campgrounds have a variable number of campsites (the actual floating platforms), with the number and locations of campsites in a campground determined by California Department of Parks and Recreation on an as-needed basis. Each double-decker campsite has a built-in barbeque grill, sink with running water, and restroom. Each campsite is used for fishing, swimming, and other water-related recreation. Usually, a floating restroom is also available at each campground, but these are discussed later in the "restrooms, floating" section.

Table SPW3 - 6. Floating Campgrounds

Facility	*TRS*	*Location*
Canyon Creek	20N05E20	Lake Oroville at Canyon Creek Bridge
Potter Ravine	20N04E25	Lake Oroville Main Body at Potter Ravine
Stringtown	19N05E02	South Fork Lake Oroville east of Stringtown Mountain
Union Creek	20N05E22	Middle Fork Lake Oroville at Union Creek

Potential Contamination Concerns: The primary contamination concerns for the floating campgrounds are bacteria from human waste and nutrient enrichment from fish cleaning and possibly discarded food items. A secondary potential concern would be contamination from petroleum byproducts since access to the campsite is by boat only.

Proposed Monitoring: Since the number and location of campsites per campground is variable, sampling at all of the campsites in all of the campgrounds may be difficult and inconsistent. Rather, it is proposed that sampling be performed at one campsite in each campground as a representative of that campground. The number of campsites at each campground would be noted at each sampling event. To the extent possible, sampling will occur at the same campsite at every sampling event, unless the campsite is not occupied.

Surface water samples for PAHs, bacteria, and nutrients will be taken in the immediate vicinity (within 30 feet) of one active campsite in the four campgrounds monthly during the high recreational use period (June to August). Physical parameters measured at the surface will include turbidity, dissolved oxygen, temperature, conductivity, and pH.

Dump Station

Description: RV dump stations within the project boundary are available at Lime Saddle and Loafer Creek. These stations are used to empty the sewage holding tanks of recreational vehicles. Each dump station has a holding tank that must be pumped out regularly.

Potential Contamination Concerns: Sloppy discharge from RVs or pumping of the holding tanks could introduce contaminants to the paved area of the dump stations, which may then be transported with surface runoff to Lake Oroville. Hoses are available at the

dump stations to wash any spillage from the pavement. The primary contamination concerns for the dump stations are bacteria and nutrients from human waste and petroleum byproducts from the RVs.

Proposed Monitoring: Since monitoring in the lake is already being performed for bacteria and petroleum byproducts at Lime Saddle and Loafer Creek, no additional sampling is being proposed. However, each dump station will be visited for visual observation and documentation of spills at each sampling event for bacteria and petroleum hydrocarbons in the lake.

Equestrian Camp

Description: One equestrian camp is within the project boundary at the Loafer Creek Recreation Area. This camp is in Township 19 N, Range 05 E, section 7 on the eastern shore of the Bidwell Canyon Arm of Lake Oroville. There are 16 campsites, each with RV hookups, small two-stall corral, and hay feeding stations. One two-unit restroom hooked up to city sewer service is available. There is a trailer that acts as a central collection point for horse manure. A fire road, which is frequently used by horseback riders and connects to the Roy Rogers Trail, is used as a dumping area for the horse stall cleanup waste from the equestrian camp. The debris is deposited on the west bank of Deadman Ravine, which is a small intermittent stream tributary to the Bidwell Canyon Arm of Lake Oroville.

Potential Contamination Concerns: Bacteria from horse manure and nutrient enrichment from horse feed and manure on the ground at the camp and piled at the fire road are the primary contamination concerns. Sedimentation from erosion may be a secondary concern.

Proposed Monitoring: Since bacteria and nutrients are the major concerns, sampling for these will be conducted at the approximate center of the campground in the Bidwell Canyon Arm of Lake Oroville and at the mouth of Deadman Ravine. Surface water samples for bacteria and nutrients will be collected monthly during the high recreational use period (June to August). Physical parameters measured at the surface will include turbidity, dissolved oxygen, temperature, conductivity, and pH.

Fish cleaning stations

Description: There are five fish cleaning stations within the project area at Bidwell Canyon, Lime Saddle, Monument Hill, Spillway, and Thermalito Forebay South. These stations have wooden shade canopies, fish cleaning counter space, metal sinks, running water, and trash cans. The sinks do not discharge into adjacent waters. At the Spillway station, the sinks are connected to a septic tank that is connected to the city sewer service via lift stations rather than a leach field, while the remaining stations depend on leach fields that connect to the sewer service to handle wastes from the sinks.

Potential contamination Concerns: The major potential contamination concern for the fish cleaning stations would be nutrient enrichment from discarded fish parts and carcasses. However, since waste products are disposed in trash cans or down the drains into leach fields/sewer systems and not discarded into the adjacent water bodies, nutrient enrichment would not be a concern.

Proposed Monitoring: Since all the waste products go to the sewer or leach field systems or trash cans, no water quality monitoring is proposed.

Marinas

Description: Two marinas, both run by concessionaires, are associated with the project.

Bidwell Canyon Marina - Bidwell Canyon Marina is in Township 19 N, Range 05 E, section 6, on the western shore of the Bidwell Canyon Arm of Lake Oroville on approximately 45 acres of State land. Services include:

- car/boat parking, with 400 spaces;
- two two-unit handicapped-accessible permanent restrooms connected to the city sewer service;
- picnicking area;
- 74-unit full-hookup tent and RV campsite with two-unit restrooms connected to the city sewer service and RV dumping stations;
- fishing access;
- houseboat tie-ups (anchored buoys);
- boat docks;
- boat ramp with 7 lanes and adjacent docks;
- six refueling pumps; and,
- concession (floating restaurant, store, small one-unit restroom, and fish cleaning facilities)
- boat maintenance facility, including boating supplies, boat painting & treatment, and houseboat renovation.

Lime Saddle Marina - Lime Saddle Marina is in Township 21 N, Range 04 E, section 18, on the western shore of the West Branch Arm of Lake Oroville on approximately 64 acres of State land. Features include:

- car/boat parking, with 205 spaces;
- two four-unit handicapped-accessible permanent restrooms that are connected to the city sewer service;
- RV dumping station;
- 25-unit tent and RV campsite;
- group camping areas;

- houseboat tie-ups (anchored buoys);
- boat docks;
- boat ramp with 5 lanes and adjacent dock;
- four refueling pumps;

- concession (floating restaurant, store, and fish cleaning facilities); and,
- boat maintenance facility, including boating supplies, boat painting & treatment, and houseboat renovation.

Potential contamination concerns: Both marinas are well serviced by paved roads and large paved car/boat parking areas above the boat ramp, usually with smaller paved car-parking areas adjacent . Within the smaller car-parking lot at Bidwell Marina lot, there is a pump and storage unit (lift station) for wastewater from the marina that connects to the city sewer system. The parking areas could contribute to turbidity and petroleum byproducts from road runoff, since the road and parking drainage system of both marinas empty directly into Lake Oroville.

The available restrooms are connected to the city sewer service and are not a water quality concern.

In the associated picnicking areas, nutrient enrichment from discarded garbage would be the only potential contamination concern. These areas are such an insignificant part of the larger facility that they would have virtually no effect on water quality in relation to the other services.

The campsites could contribute sediment from erosion during runoff. During initial construction, road cuts and site leveling could have left unvegetated scars susceptible to erosion. The vehicle use (RVs and automobiles) of the campers could contribute petroleum byproducts leaks or spills. The RV dumping station has a self-contained storage tank that is pumped out. The only concern would be leaky storage tanks or accidental spills. These could contribute to bacteria and organic material in the lake.

The boat docks and houseboats at the tie-ups can contribute to bacteria and organic materials from sewage due to leaky containment tanks, open valves, or deliberate dumping. Additionally, the houseboats can contribute to petroleum byproducts from spills, leaky gas tanks, and bilge.

The associated boat launch ramps, as well as the boat docks, could contribute petroleum byproducts from spills, leaky gas tanks, and bilge. The potential for erosion at the boat ramps is low because the ramps are concreted and, in the case of Lime Saddle, the adjacent shoreline is heavily rocked with riprap.

The refueling pumps could contribute petroleum byproducts through spills, leaky gas tanks or lines, or leaky fuel storage tanks.

The marina concessions sell an assortment of boating, maintenance, and general supplies. These products (e.g., batteries, cleaning solutions, flashlights, etc.) could introduce a variety of chemical or heavy metal contaminants if released into the water by the boating public.

The boat repair shop is addressed under “Boat, Maintenance Facilities.”

Proposed Monitoring: Two sampling sites are proposed at each facility. Sampling would be monthly during the high recreational use period (June to August). Sampling would also occur during runoff from the first fall rains. One sampling site at each marina would be near the floating concession/fueling facility. The second sampling site at each facility would be approximately 30 feet from the edge of the water at the end of the boat ramp. Samples would be taken for bacteria, nutrients, metals, and PAHs.

Nature study

Description: Nature study, primarily bird watching, seems to be confined to the Feather River and Oroville Wildlife Area primitive campground. The road system along the Feather River is unpaved and requires four-wheel drive for some of its length.

Potential contamination concerns: The only concern that could arise from the limited amount of nature study along the Feather River would be petroleum byproducts from traffic. However, none of this traffic would have any contact with project waters. Another component would be from the camping activities at the campground. The primitive campground at the Oroville Wildlife Area is surrounded by levees and does not drain directly into any project or adjacent waters.

Proposed Monitoring: No new monitoring is proposed.

Picnicking

Descriptions: There are twelve picnic areas (Table SPW3-7) within the project area, usually associated with another facility.

Table SPW3 - 7. Picnic Areas

Facility	*Capacity (Tables)*
Bidwell Bar Bridge @ Bidwell Canyon Marina	10
Forebay North	110
Forebay South	10
Kelly Ridge Visitor Center	15
Lime Saddle	15
Loafer Creek	100
Monument Hill	10
Oroville Dam @ Oro Dam Blvd	3
Oroville Wildlife Area @ Afterbay Outlet	5
Oroville Wildlife Area Campground	-
Spillway	50
Thermalito Afterbay Boat-In Picnic Areas	11

The picnic area at the Oroville Wildlife Area campground does not have permanent picnic tables, so the capacity is unknown at this time.

Potential Contamination Concerns: Nutrient enrichment from discarded garbage would be the primary contamination concern at picnic areas. Other concerns are associated with the other services provided at the facility, such as adjacent swim areas, restrooms, and boat launches. Five picnic areas are such an insignificant part of a larger facility that they would have virtually no effect on water quality in relation to the other services. These areas include Bidwell Bar Bridge at Bidwell Canyon Recreation Area, Lime Saddle Recreation Area, Kelly Ridge Visitor Center, Oroville Dam at Oro Dam Boulevard, and the Spillway Boat Launch. These other services are discussed in their respective sections.

Proposed Monitoring: Since the main concern at picnic areas is aesthetic from discarded garbage, no water quality monitoring is proposed.

Restrooms

Descriptions: There are permanent restrooms associated with many of the recreational facilities within the project area. These restrooms, if available, are discussed under each facility. Most of the available restrooms are on city sewer service, as in the campgrounds, larger boat launches, and marinas, or have sealed holding tanks, as does the Monument Hill facility. The South Forebay and Wilbur Road boat launches have only portable restrooms.

Restrooms, Floating

Description: There are ten floating restrooms (called "S. S. Relief") in Lake Oroville maintained by the California Department of Parks and Recreation (Table SPW3-8). Each restroom has a holding tank that must be pumped out regularly. Four are associated with floating campgrounds, which are also maintained by CDPR and described above.

Table SPW3 - 8. Floating Restrooms

Facility	*TRS*	*Location*
Bidwell Canyon	20N05E32	Bidwell Canyon Arm Lake Oroville
Bloomer Island	20N04E02	North Fork Lake Oroville 'The Slot'
Canyon Creek	20N05E20	Lake Oroville at Canyon Creek Bridge
Kelly Ridge	20N05E31	Lake Oroville Main Body west of Kelly Ridge
Potter Ravine	20N04E25	Lake Oroville Main Body at Potter Ravine
Rich Gulch	21N04E22	West Branch Lake Oroville at Rich Gulch
Shields Gulch	21N04E13	North Fork Lake Oroville at Shields Gulch
Stringtown	19N05E02	South Fork Lake Oroville east of Stringtown Mountain
Sycamore Gulch	20N05E22	Middle Fork Lake Oroville at Sycamore Gulch
Union Creek	20N05E22	Middle Fork Lake Oroville at Union Creek

Potential Contamination Concerns: The main concern with these facilities is the possibility of release of bacteria and organic material from the human sewage being held in the tank or accidentally spilled during pumpout.

Proposed Monitoring: Two representative floating restrooms will be sampled to determine potential contamination from bacteria (Bloomer Island and Kelly Ridge).

Surface water samples for coliform bacteria and nutrients will be taken in the immediate vicinity (within 30 feet) of the restrooms. Sampling will be performed monthly during the high recreational use period (June to August). Physical parameters measured at the surface will include turbidity, dissolved oxygen, temperature, conductivity, and pH.

Swim areas

Description: There are four developed swim areas within the project area. Additionally, there are two areas frequently used by the public in large numbers (Table SPW3-9) for swimming. On the major summertime holidays, such as Memorial Day, fourth of July, and Labor Day, the number of people utilizing project waters increases dramatically. Swimming at the few swim beaches (North Thermalito Forebay, South Thermalito Forebay, Loafer Creek, and Monument Hill) is dominated by families with children. This raises the concern that bacteria levels at these beaches may increase far above the background levels

Table SPW3 - 9. Swim Areas

Facility	*TRS*	*Managing Agency*	*Other Swimming-Related Services/Facilities Present*
North Forebay RA	19N03E01	CDPR	Restrooms (permanent), swim showers, adjacent picnic area
South Forebay RA	19N03E10	CDPR	Restrooms (portable), adjacent picnic area
Loafer Creek RA	19N05E05	CDPR	Restrooms (permanent), swim showers, adjacent picnic area
Monument Hill RA	19N03E17	CDWR	Restrooms (permanent), adjacent picnic area
Foreman Creek Boat Ramp	20N05E18	CDWR	None
Stringtown Boat Ramp	19N05E02	CDWR	None

Potential Contamination Concern: The major potential contamination concern at the swim areas is fecal bacteria and organic material from human contact with the water, while fecal bacteria from the portable restrooms may be an additional concern at South Forebay. There may also be some concern of nutrient enrichment from discarded food and garbage from the adjacent picnic areas. However, garbage is primarily an aesthetic, not a water quality, concern.

Proposed Monitoring: The major potential contamination concern is fecal bacteria. Bacteria sampling occurred under SPW1 during the Labor Day holiday. Samples were taken five times in the thirty days around the holiday (included sampling on Labor Day). Unless results indicate that there was a problem, no new sampling is proposed under this study plan.

Special Events

Description: An additional concern that arises in the project area is the potential for contamination during special events, such as fishing tournaments and holidays, such as the fourth of July or Labor Day. These circumstances create unique concerns primarily due to the large numbers of people in a short period.

Fishing Tournaments: There are many fishing tournaments in Lake Oroville, with as many as ten scheduled in a month (Table SPW3-10). The target species for all of these tournaments is bass. The table below lists only those tournaments that are large enough to require permits. Apparently, there are numerous tournaments too small to require a permit which occur almost constantly year-round (Eric See, CDWR, pers. comm.).

Table SPW3 - 10. Scheduled and Permitted Fishing Tournaments

Month	*Date(s)*	*Sponsor*	*Weigh-In Location*	*Duration*
January	12	Bass Busters of Yuba City	Bidwell	Safelight-1500
	13	Western Bass	Bidwell	0600-1600
	19	American Bass	Spillway	0600-1500
	20	NewBass	Spillway	0600-1500
	26-27	Western Bass	Bidwell	0600-1600
February	2	WON Bass	Bidwell	0700-1500
	3	Anglers Choice	Lime Saddle	Safelight-1500
	9-10	WON Bass	Spillway	Safelight-1500
	16	Operation Bass	Bidwell	Safelight-1500
	17	Folsom Bass Team	Spillway	Safelight-1500
	23	Great Basin Bassers	Bidwell	Safelight-1500
	24	American Bass	Spillway	0600-1500
March	2	KALF Radio	Bidwell	0600-1600
	3	Redding Bassers	Spillway	Safelight-1530
	8-9	Western Bass	Spillway	0600-1600
	10	Western Bass	Bidwell	0600-1600
	16	NewBass	Spillway	0600-1500
	17	Western Bass	Bidwell	0600-1600
	23	Western Bass	Bidwell	0600-1600
	24	American Bass	Bidwell	0600-1500
	30	Gold Country Bassers	Bidwell	0630-1500
	31	NewBass	Spillway	0600-1500
April	6	Bass Busters of Yuba City	Bidwell	Safelight-1500
	13	American Bass	Spillway	0600-1500
	14	Folsom Bass Team	Spillway	Safelight-1500
	20	Chico Bass & Conservation	Spillway	Safelight-1500
	21	Chico Bass & Conservation	Spillway	Safelight-1500
	27-28	NewBass	Spillway	0600-1500
May	4-5	Bass Wranglers	Bidwell	Safelight-1500
	5	Anglers Choice	Bidwell	Safelight-1500
	11	Oroville Salvation Army	Bidwell	Safelight-1500
	18	WON Bass	Bidwell	0700-1500
	19	American Bass	Bidwell	0500-1500
June	2	NewBass	Spillway	0600-1500
	8	Western Bass	Spillway	0600-1500

	9	American Bass	Spillway	0600-1500
	15	WON Bass	Bidwell	0700-1500
	16	Anglers Choice	Spillway	Safelight-1200
	30	California Bass Federation	Spillway	0600-1200
July	14	American Bass	Spillway	0500-1200
August	18	American Bass	Bidwell	0500-1200
September	14	Western Bass	Spillway	0500-1200
	15	Anglers Choice	Spillway	Safelight-1200
	21	Chico Bass & Conservation	Spillway	Safelight-1500
October	5-6	Western Bass	Bidwell	0600-1600
	12	Western Bass	Spillway	0500-1200
	12-13	Western Bass	Spillway	0600-1600
	13	NewBass	Spillway	0600-1500
	18-19	Anglers Choice	Spillway	Safelight-1500
	26	WON Bass	Bidwell	0700-1500
November	3	Western Bass	Bidwell	0630-1600
	9	Bass Busters of Yuba City	Bidwell	Safelight-1500
	10	Folsom Bass Team	Bidwell	Safelight-1500
	16-17	New Bass	Bidwell	Safelight-1500

Holidays: During the more popular summer holidays, July 4th and Labor Day, the numbers of people in and on the project waters increases dramatically, especially at the swim areas. Monitoring of the swim areas during the holidays has already been performed under SPW1. For a discussion of this, see section "Swim Areas".

Potential Contamination Concern: During the fishing tournaments, a potential contamination concern is from the increased boat traffic, leading to a chance of increased input of petroleum byproducts to project waters. There is also a minor concern from nutrient enrichment from cast-off fish parts or carcasses and garbage.

Proposed Monitoring: Sampling is proposed for two fishing tournaments in the spring and summer of 2003 on the day of the tournament. Water samples for PAHs will be taken at the surface at the Lake Oroville water quality stations during the monthly water quality runs under SPW1. Physical parameters and nutrients are already scheduled for monitoring under SPW1.

Conclusion

In this study, the recreational facilities, operations, and activities associated with the Oroville Project were assessed for potential contamination concerns that could effect the physical, chemical, or biological integrity of water quality. Concerns that were identified included potential contamination from sediments, nutrients, bacteria, petroleum byproducts, metals, and boat maintenance and cleaning products.

This study plan proposes 23 sampling sites among 26 recreational facilities (Table SPW3-11). Water quality analyses will include bacteria, nutrients, pesticides, and PAHs. Potential erosion will be monitored through visual assessments. Physical parameters

measured will include dissolved oxygen, conductivity, pH, temperature, and turbidity. All of the water samples will be taken at the surface.

Table SPW3 - 11. Proposed Sampling

Recreational Facility Type	*Bacteria*	*Metals*	*Nutrients*	*Pesticides*	*PAHs*	*Turbidity*
All-Terrain Vehicle/Off-Road Vehicle	*No new monitoring proposed*					
- Oroville ORV Recreation Area						
Bike/Hiking/Horse trail						
- Bidwell Canyon Trail						*Visual inspection*
- Brad Freeman/Oroville Bike Trail						*Visual inspection*
- Dan Beebe Trail						*Visual inspection*
- Loafer Creek Trail	Y		Y			*Visual inspection*
Boat/car top access						
- Afterbay Outlet						*Visual inspection*
- Dark Canyon						*Visual inspection*
- Foreman Creek						*Visual inspection*
- Mile Long Pond						*Visual inspection*
- Nelson Bar						*Visual inspection*
- Oroville Wildlife Area (2)						*Visual inspection*
- South Afterbay						*Visual inspection*
- String town						*Visual inspection*
- Vinton Gulch						*Visual inspection*
Boat, power					*Y*	
Boat, house						
- Bidwell Marina	Y		Y		*Visual inspection*	*Visual inspection*
- Lime Saddle Marina	Y		Y		*Visual inspection*	*Visual inspection*
Boating/no power	*No new monitoring proposed*					
Boat launch						
- Bidwell Canyon					Y	*Visual inspection*
- Enterprise					*Visual inspection*	*Visual inspection*
- Lime Saddle					Y	*Visual inspection*
- Loafer Creek					*Visual inspection*	*Visual inspection*

Recreational Facility Type	*Bacteria*	*Metals*	*Nutrients*	*Pesticides*	*PAHs*	*Turbidity*
Boat launch (continued)						
- Monument Hill					*Visual inspection*	*Visual inspection*
- North Forebay					*Visual inspection*	*Visual inspection*
- South Forebay					*Visual inspection*	*Visual inspection*
- Spillway					Y	*Visual inspection*
- Wilbur Road @ North Afterbay					*Visual inspection*	*Visual inspection*
Boat-in camping						
- Bloomer Primitive	Y		Y		Y	
- Craig Saddle	Y		Y		Y	
- Goat Ranch	Y		Y		Y	
Boat, maintenance facilities						
- Bidwell Canyon		Y		Y	Y	Y
- Lime Saddle		Y		Y	Y	Y
- North Forebay		Y		Y		Y
Campfire center, Campground, & Camping/group						
- Bidwell Canyon	Y		Y			*Visual inspection*
- Lime Saddle	Y		Y			*Visual inspection*
- Loafer Creek	Y		Y			*Visual inspection*
- Oroville Wildlife Area						*Visual inspection*
Camping, floating						
- Canyon Creek	Y		Y		Y	
- Potter Ravine	Y		Y		Y	
- Stringtown	Y		Y		Y	
- Union Creek	Y		Y		Y	
Dump station						
- Bidwell Canyon						*Visual inspection*
- Lime Saddle						*Visual inspection*

Recreational Facility Type	*Bacteria*	*Metals*	*Nutrients*	*Pesticides*	*PAHs*	*Turbidity*
Equestrian camp						
- Loafer Creek	Y		Y			*Visual inspection*
Fish cleaning station	*No new monitoring proposed*					
- Bidwell Canyon						
- Lime Saddle						
- Monument Hill)						
- South Forebay						
- Spillway						
Marina (Concessions, Fuel)						
- Bidwell Canyon	Y	Y	Y		Y	Y
- Lime Saddle	Y	Y	Y		Y	Y
Nature study	*No new monitoring proposed*					
Picnicking	*No new monitoring proposed*					
- Bidwell Bar Bridge						
- Kelly Ridge Visitor Center						
- Lime Saddle						
- Loafer Creek						
- Monument Hill						
- North Forebay						
- Oroville Dam @ Oro Dam Blvd						
- Oroville Wildlife Area @ Afterbay Outlet						
- South Forebay						
- South Afterbay Boat-in Picnic Areas						
- Spillway						
Restrooms						
Restrooms, floating						
- Bidwell Canyon						
- Bloomer Island	Y		Y			
- Canyon Creek						
- Kelly Ridge	Y		Y			
- Potter Ravine						
- Rich Gulch						
- Shields Gulch						
- Stringtown						
- Sycamore Gulch						
- Union Creek						

Recreational Facility Type	***Bacteria***	***Metals***	***Nutrients***	***Pesticides***	***PAHs***	***Turbidity***
Swimming	*No new monitoring proposed*					
- Foreman Creek						
- Loafer Creek						
- Monument Hill						
- North Forebay						
- South Forebay						
- Stringtown						
Special Events						
- Fishing Tournaments					Y	
- Holidays						